



Urban inequality: a hypothetical risk factor for myopia

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ABSTRACT

Background: Myopia is a common refractive error with an expected increase in prevalence. Inequalities in access to ocular health care for sight-threatening or life-threatening ocular diseases have been described. Urbanization is a risk factor for both the incidence and progression of myopia; however, socioeconomic inequalities in urban settings are a new concept in myopia incidence.

Hypothesis: Considering the proven impact of inequalities existing in general and ocular health, urban inequality could be a new risk factor for both the incidence and progression of myopia. Inequalities in urban infrastructure vary between countries; however, there are currently various manifestations of urban inequality, and scholars are concerned about intra-urban inequality as a public health risk. Considering the significant influence of urban inequality on health of children, and because myopia develops and progresses faster during childhood, the effect of urban inequality on myopia must be examined. Although urban inequality could be a putative risk factor for myopia, a causal relationship should be investigated. However, myopia is multifactorial in etiology, originating from the interaction of environmental and genetic factors. Thus, causality between urban inequality and myopia should be investigated through a randomized, controlled trial with strict matching of genetic backgrounds and environmental factors.

Conclusions: Several risk factors for myopia have been proposed, and studies have confirmed causal relationships with most of these factors. Considering the proven impact of urban inequality on both general and ocular health, experimental studies are necessary to confirm the possible causal relationship between urban inequality and myopia. Certainly, there will be substantial challenges in the implementation phase.

KEY WORDS

myopia, justice, inequality, urban inequality, genetic, environment, risk factor

INTRODUCTION

The complex interplay of global and social justice, climate change, and infectious disease outbreaks [1] has demonstrated the effect of inequalities on human health. Inequalities in social well-being and access to health care services are present not only in impoverished countries, but also in the wealthiest [2]. Improvement of health equity is among the prerequisites for health promotion [3].

Global urbanization is increasing, and health inequalities in urban settings are more prominent, including in European urban areas [4]. Human health status is affected by the facilitation or hindering of opportunities to use both hard urban infrastructure, such as transportation, as well as soft infrastructure, such as health and social services [5]. Urban children are consistently more at risk of ill-health in both wealthier and impoverished countries or cities. Vulnerable urban children are facing unequal access to educational opportunities and health

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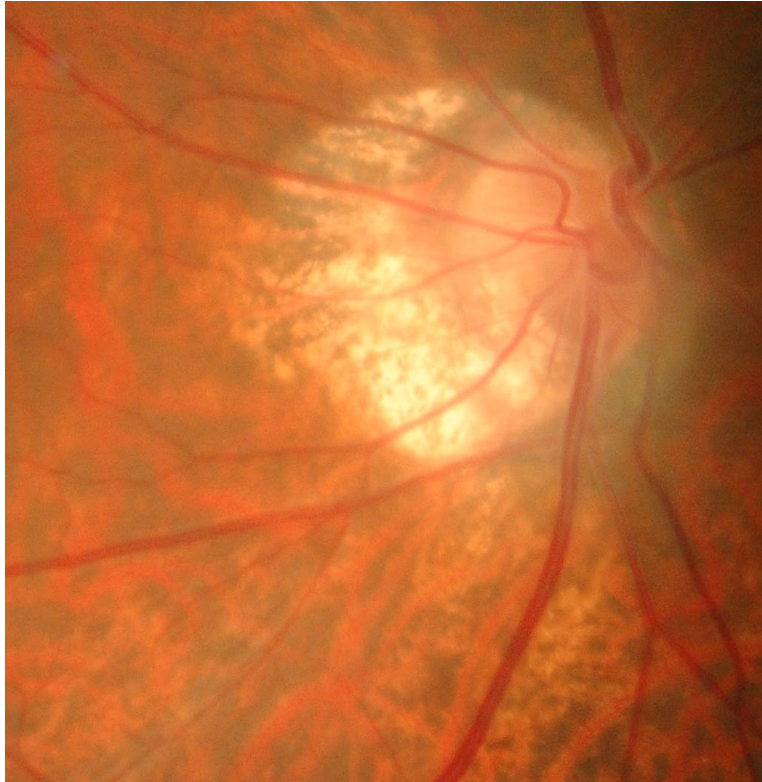


Figure 1. Color fundus photo of the right eye of an Asian patient with typical myopic changes, including tilted optic disc and peripapillary atrophy of the retinal pigment epithelium and choroid.

services. Therefore, the effect of injustice in the distribution of urban resources, and the consequent health outcomes for current and future generations of children, could be remarkable [6].

Likewise, inequalities in access to ocular health care for sight-threatening or life-threatening eye diseases have been identified in impoverished and wealthier countries [7-13]. Wide ranges of disparities in ocular health are reported in the literature. For example, poor socioeconomic status was associated with larger ocular toxoplasmosis lesions [13]. Delayed diagnoses of amblyopia were more likely in children from poorer socioeconomic backgrounds [9]. Substantial disparities exist in vision screening coverage for preschool children due to socioeconomic differences [14]. Access is poor to comprehensive eye examinations for children living in the most materially deprived neighborhoods [8]. Fewer strabismus surgeries were performed, and patients were less likely to receive secondary operations, in a socioeconomically deprived cohort [7]. Large disparities and survival gaps were observed between higher-income and lower-income countries in retinoblastoma treatment outcomes [15]. Poor socioeconomic status limits access to pediatric eye care services in African countries [16]. Myopia is more prevalent among school children of poor socioeconomic status compared to those of mid-socioeconomic status [10].

Myopia (Figure 1) is a common refractive error that is expected to increase in prevalence [17]. Urbanization is among the risk factors for the development and progression of myopia [18]. A meta-analysis of 143 published articles from 42 countries, including a total of 74,847 participants with myopia, found that children in urban settings have a 2.6-fold higher risk of developing myopia compared to those in a rural setting [19]. Enthoven et al. [20] proposed socioeconomic inequalities as a new concept in myopia incidence. They observed that children from socioeconomically disadvantaged families were more likely to develop myopia compared with their counterparts of high socioeconomic status. Myopia incidence was higher in children of mothers with less education and families with lower net household income. An increase in outdoor exposure did not significantly reduce myopia progression in children from families with lower-educated mothers [20].

HYPOTHESIS

Considering the proven impact of these inequalities on general and ocular health, this author proposes urban inequality as a new risk factor for both the incidence and progression of myopia. Urban settings undergo rapid

gentrification, and poorer neighborhoods face boosted investment and an influx of new residents of higher socioeconomic status, potentially deepening urban inequality and health disparities [21]. Inequalities in urban infrastructure may vary between countries [22]; however, this challenge is global, and in this regard, the Database on Urban Inequality and Amenities has been developed [23].

Currently, there are various dimensions of urban inequality, and scholars are concerned about its manifestation as a public health risk. Ties between urban inequality and poor health outcomes have been empirically demonstrated [24, 25]. Urban inequality disproportionately worsens the health and well-being of children when compared to adults. Vulnerable children are facing various social and health problems [6, 26].

Considering the significant association of urban inequality with health, especially in children, and because myopia develops and progresses more rapidly during childhood [27], it is necessary to carefully examine the effect of urban inequality on myopia.

EVALUATION OF THE HYPOTHESIS

Vesselinov et al. noted that inequality in metropolitan regions will increase if the current concentration of new gated communities continues [28]. Therefore, one can infer that increased urban inequality can become a substantial trend in the future. In a cross-sectional study using the health vulnerability index, Januário et al. found a significant intra-urban correlation between health vulnerability and newborn hearing screening outcomes [25]. Although urban inequality could be a putative risk factor for myopia, this should be confirmed by determining causality.

Causality is best examined within the context of a double-blind, randomized, controlled trial [29]. Myopia is multifactorial in etiology, originating from the interaction of environmental and genetic factors. Therefore, causality between urban inequality and myopia should be investigated through a randomized, controlled trial with strict matching of genetic backgrounds and environmental factors [30]. Because of considerable confounding, a more robust design should be chosen to substantially reduce possible errors [31]. An alternative approach is to design a twin study, as participants are perfectly matched [32]. Certainly, there will be substantial challenges in the implementation phase.

CONCLUSIONS

Myopia is a common refractive error that is expected to increase in prevalence. Several risk factors have been proposed for this preventable, treatable, and complicated condition, and studies have confirmed a causal relationship with most of these proposed factors. Considering the proven impact of inequalities in general—and specifically urban inequalities—on general and ocular health, experimental studies to confirm any causal relationship between urban inequality and myopia are necessary. Certainly, there will be substantial challenges in the implementation phase.

ETHICAL DECLARATIONS

Ethical approval: Not required.

Conflict of interests: None

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